

1. INTRODUCTION

Nine samples were collected, each sample divided into five subparts by the laboratory (for a total of forty-five samples), and analyzed for Uranium-234/235/238 activity to support the Tank V-9 (TSF-18) Sampling for Operable Unit 1-10 project in support of Statement of Work (TOS) ER-SOW-380. The laboratory data package met the requested Level-A reporting requirements as per ER-SOW-163. The radioanalytical data were validated to analytical method data validation Level-A, in accordance with INEEL data validation procedures TPR-79 & TPR-80 (References A & C).

GDE-7003

2. TASK SPECIFIC VALIDATION IDENTIFICATION INFORMATION

A.	L&V Report Number:	<u>BBWI-PR025-06-01</u>	F.	Reporting Level:	<u>Tier I</u>
B.	SDG Number:	<u>1RD001013A</u>	G.	Validation Level:	<u>A</u>
C.	Number of Samples:	<u>45</u>	H.	TOS Number:	<u>ER-SOW-380</u>
D.	Sample Type/Matrix:	<u>45 Sludge</u>	I.	Analytical Lab:	<u>BWLVA</u>
E.	Analysis Type:	<u>U-234/235/238</u>	J.	LTI Number:	<u>0105041</u>
			K.	Validator:	<u>Bridget Hoopes</u>
			L.	Validator Affiliation:	<u>Portage</u>
			M.	Completion Date:	<u>06-12-01</u>

3. DATA VALIDATION PRECAUTIONS AND LIMITATIONS

It should be noted that this TPR describes method validation only and is not intended to provide guidance for validation of overall program/project objectives and requirements. Project validation is generally performed by project management personnel and involves a comprehensive review of all aspects (and objectives) of a sampling and analysis project.

The entire radioanalytical measurement process is a very elaborate process because it is composed of many elements and occurs in various phases/steps (from purchase, setup, calibration, and maintenance of detection systems, chemical separations/sample preparation processes, sample counting, analyses, reporting, and performance-monitoring of each of these elements). A considerable amount of information, data, and knowledge is generally required to technically support the accuracy, precision, and defensibility of each radioanalytical result. Enormous amounts of information and data are available at the laboratories that would probably be necessary in order to properly defend each radioanalytical result; however, it would be unreasonable to request all such data be included in each data package. It is the attempt of this procedure to achieve the best possible assurance of data defensibility and usability with the information available (required/requested) with each data package.

4. SAMPLE IDENTIFICATION

FIELD SAMPLE IDENTIFICATION NUMBER:	LABORATORY IDENTIFICATION NUMBER:	SAMPLE MATRIX:
1RD001013A	010541-01	Sludge
1RD001023A	010541-02	Sludge
1RD001033A	010541-03	Sludge
1RD001043A	010541-04	Sludge
1RD001053A	010541-05	Sludge
1RD002013A	010541-06	Sludge
1RD002023A	010541-07	Sludge
1RD002033A	010541-08	Sludge
1RD002043A	010541-09	Sludge
1RD002053A	010541-10	Sludge
1RD003013A	010541-11	Sludge
1RD003023A	010541-12	Sludge
1RD003033A	010541-13	Sludge
1RD003043A	010541-14	Sludge
1RD003053A	010541-15	Sludge
1RD004013A	010541-16	Sludge
1RD004023A	010541-17	Sludge
1RD004033A	010541-18	Sludge
1RD004043A	010541-19	Sludge
1RD004053A	010541-20	Sludge
1RD005013A	010541-21	Sludge
1RD005023A	010541-22	Sludge
1RD005033A	010541-23	Sludge

FIELD SAMPLE IDENTIFICATION NUMBER:	LABORATORY IDENTIFICATION NUMBER:	SAMPLE MATRIX:
1RD005043A	010541-24	Sludge
1RD005053A	010541-25	Sludge
1RD006013A	010541-26	Sludge
1RD006023A	010541-27	Sludge
1RD006033A	010541-28	Sludge
1RD006043A	010541-29	Sludge
1RD006053A	010541-30	Sludge
1RD007013A	010541-31	Sludge
1RD007023A	010541-32	Sludge
1RD007033A	010541-33	Sludge
1RD007043A	010541-34	Sludge
1RD007053A	010541-35	Sludge
1RD008013A	010541-36	Sludge
1RD008023A	010541-37	Sludge
1RD008033A	010541-38	Sludge
1RD008043A	010541-39	Sludge
1RD008053A	010541-40	Sludge
1RD009013A	010541-41	Sludge
1RD009023A	010541-42	Sludge
1RD009033A	010541-43	Sludge
1RD009043A	010541-44	Sludge
1RD009053A	010541-45	Sludge

5. CONTRACT AND TECHNICAL REVIEW (CTR)

This section contains the contract and technical review comments describing the findings and observations for each of the main verification and validation parameters described in TPR-80. The actions taken for each analysis and the reasons why a particular data qualifier flag was assigned are also included. The following verification and validation parameters were reviewed.

A. COMPLETENESS OF THE DATA REPORT PACKAGE

The BWLVA data package bearing SDG#: 1RD001013A, was complete and met all the required Tier I reporting requirements described in ER-SOW-163 necessary to perform Level A data validation in accordance with TPR-80.

B. EVALUATION OF REPORTED RESULTS

For level-A data validation, evaluation of reported results versus raw data is applicable. All supporting materials provided indicate results were reported in accordance with the requirements set forth in ER-SOW-163.

All of the sample-specific information for each sample has been reported correctly. Sample results obtained from spectrometric analysis do not require verification when the results were obtained from computer analysis software that has received approval by the INEEL Sample Management office.

Per TPR-80, sec. 3.2.C.11, a minimum of 10% of analytical results have been checked to verify that the calculations were performed correctly and consistently; all reported results that were verified versus their associated raw data demonstrated that reported results are accurate.

C. DETECTOR SYSTEM CALIBRATIONS AND OPERATIONAL PERFORMANCE CHECKS

All calibrations, calibration verification checks, and background checks provided support the "In control" designation reported on each of the ER-SOW-163 Form IIIs. Therefore, the detector calibrations were in control and the instruments were operating properly during the counting/analysis of the reported sample results; no qualification is warranted.

D. LABORATORY CONTROL SAMPLE RESULTS

The laboratory control sample (LCS) is analyzed to demonstrate that the recovery of the requested nuclide of interest is accurate; the acceptable or out of compliance performance of the LCS directly reflects on the effectiveness of the analytical process from sample preparation through instrumental measurements.

TPR-80, sec. 4.2.B.2 requires "the LCS matrix should be equivalent (to the extent possible) to that of the samples analyzed." The samples included in this SDG are of a sludge matrix, while the LCS analyzed is of a liquid matrix. Due to the difficulty of preparing a "sludge" LCS, the use a liquid LCS is equivalent to the extent possible of a "sludge" LCS.

LCS recoveries were provided for each of the isotopes of interest. All LCS results provided have met the limits of 70-130% recovery for gross alpha and gross beta measurements, with the exception of U-235, outlined in TPR-80, sec. 4.2.C.4.

In the case of U-235 (137.7%), one of the three LCS results was greater than the prescribed limit. Therefore, per TPR-80, sec. 4.2.D.3, all U-235 results associated with preparation batch 511-41, as noted in the raw data, have been qualified 'J' due to high LCS recovery and statistically positive results greater than the MDA. Preparation batch 511-41 is composed of samples 1RD001013A, 1RD001023A, 1RD001033A, 1RD001043A, 1RD001053A, 1RD002013A, 1RD002023A, 1RD002033A, 1RD002043A, 1RD002053A, 1RD003013A, 1RD003023A, 1RD003033A, 1RD003043A, and 1RD003053A.

E. LABORATORY METHOD BLANK RESULTS

A laboratory generated blank sample (or method blank) analyzed for each sample delivery group (1-blank : 20 samples) is a means of determining the existence and magnitude of contamination resulting from the sample preparation and analysis/measurement process. Any statistically positive activity detected for a target radionuclide indicates a potential positive bias in the project sample results associated with statistically positive nuclides.

Three laboratory generated blanks were analyzed with this SDG for each applicable target radionuclide. There were no statistically positive results noted for any target radionuclides. Therefore, no qualification is necessary per TPR-80, sec. 4.3.D.1.a.

F. LABORATORY GENERATED DUPLICATE RESULTS

The information obtained from the analysis of laboratory generated duplicates is useful to evaluate analytical variability and laboratory precision. Results from the analysis of laboratory generated duplicate samples can also reflect the homogeneity or inhomogeneity of individual samples or groups of samples of the same matrices. For a duplicate sample to meet the acceptance criteria outlined in TPR-80 - Section 4.4, sample precision must be ≤ 3 for the mean difference (MD) and/or $\leq 20\%$ relative percent difference (RPD) for water samples. However, the mean difference takes precedence over the calculation and use of RPD for duplicate precision (TPR-80 - Section 4.4, Subsection 2).

Duplicate sample results for all isotopes demonstrated acceptable laboratory precision with MD values < 3 ; all results exhibited statistically positive sample results (See Attachment 5). Per TPR-80, sec. 4.4.C.4, the RPD calculation does not need to be calculated when the MD value is < 3 .

G. LABORATORY ANALYTICAL YIELDS

The evaluation of an analytical yield serves to evaluate the efficiency of radiochemical separations utilized when preparing samples for measurement or analysis. The use of a tracer is conducted when a known amount of a chemical tracer is added to unknown samples; during analysis, a yield or recovery of the tracer material is used to determine the efficiency of the entire analytical process. The tracer that is chosen is used because it mimics the properties of one or more target radionuclides.

The sample analysis of U-234/235/238 met the tracer recovery criteria of 30-110% outlined for uranium analysis of natural and QC samples, per TPR-80, sec. 4.5.C.

H. ANALYTICAL HOLDING TIMES

The holding time requirements (i.e. < 6 months) were met for this SDG.

I. FIELD SAMPLE PRESERVATION

None of the samples associated with this SDG were of a liquid nature; therefore, they did not require preservation.

J. LABORATORY INTERCOMPARISON QC RESULTS

The Intercomparison QC testing program currently includes participation in the following QC programs: The U.S. Department of Energy (DOE) Environmental Measurement Laboratory (EML) Quality Assessment Program (QAP) and the U.S. DOE Office of Environmental Management, Mixed Analyte Performance Evaluation Program (MAPEP). Although, laboratory intercomparison QC results were not provided for DOE EML QAP, results for DOE MAPEP were provided for all isotopes from each analysis type applicable to this SDG.

BWLVA received a warning flag ('W') from the DOE MAPEP intercomparison conducted in 2000 due to high bias in analysis of U-233/234. This deficiency, coupled with reporting only DOE MAPEP results has resulted in the entry of a 'Q' flag into the data quality assessment table for each analyte. However, per TPR-80, sec. 4.8.A(NOTE), and TPR-80, sec. 4.8.D.2, no qualifier flags have been assigned to sample results.

K. INEEL PE SAMPLE RESULTS

There were no INEEL performance evaluation samples noted in the transmittal of this report, nor on any of the official documents. Therefore, no evaluation of INEEL PE standards was conducted.

6. DATA LIMITATIONS AND USABILITY OVERVIEW

This section provides an overview of the limitations of the data for each sample and for each analysis.

6.1 Summary of Qualified Data

All samples exhibited positive detections of radioisotope activity in the samples associated with the Tank V-9 (TSF-18) Sampling for Operable Unit 1-10 Project. Statistically positive sample results greater than their respective MDA's are listed in Table 6.0.

Table 6.0. Summary of Statistically Positive Results by Sample	
1RD001013A	U-234, U-235, U-238
1RD001023A	U-234, U-235, U-238
1RD001033A	U-234, U-235, U-238
1RD001043A	U-234, U-235, U-238*
1RD001053A	U-234, U-235, U-238
1RD002013A	U-234, U-235, U-238
1RD002023A	U-234, U-235, U-238
1RD002033A	U-234, U-235, U-238
1RD002043A	U-234, U-235, U-238
1RD002053A	U-234, U-235, U-238
1RD003013A	U-234, U-235, U-238
1RD003023A	U-234, U-235, U-238
1RD003033A	U-234, U-235, U-238
1RD003043A	U-234, U-235, U-238
1RD003053A	U-234, U-235, U-238
1RD004013A	U-234, U-235, U-238
1RD004023A	U-234, U-235, U-238

Table 6.0. Summary of Statistically Positive Results by Sample	
1RD004033A	U-234, U-235, U-238
1RD004043A	U-234, U-235, U-238
1RD004053A	U-234, U-235, U-238
1RD005013A	U-234, U-235, U-238
1RD005023A	U-234, U-235, U-238
1RD005033A	U-234, U-235, U-238
1RD005043A	U-234, U-235, U-238
1RD005053A	U-234, U-235, U-238
1RD006013A	U-234, U-235, U-238
1RD006023A	U-234, U-235, U-238
1RD006033A	U-234, U-235, U-238
1RD006043A	U-234, U-235, U-238
1RD006053A	U-234, U-235, U-238
1RD007013A	U-234, U-235, U-238
1RD007023A	U-234, U-235, U-238
1RD007033A	U-234, U-235, U-238
1RD007043A	U-234, U-235, U-238
1RD007053A	U-234, U-235, U-238
1RD008013A	U-234, U-235, U-238
1RD008023A	U-234, U-235, U-238
1RD008033A	U-234, U-235, U-238*
1RD008043A	U-234, U-235, U-238*
1RD008053A	U-234, U-235, U-238
1RD009013A	U-234, U-235, U-238*
1RD009023A	U-234, U-235, U-238*
1RD009033A	U-234, U-235, U-238*
1RD009043A	U-234, U-235, U-238
1RD009053A	U-234, U-235, U-238*

*Per guidance provided by the INEEL SMO these sample results may be interpreted as statistically positive as follows:

The U-238 results for samples 1RD001043A, 1RD008033A, 1RD008043A, 1RD009013A, 1RD009023A, 1RD009033A, and 1RD009053A have been qualified 'J' due to activity that is greater than the MDA but between 2x and 3x the uncertainty associated with the result.

Remaining sample results are summarized below.

Uranium-234/235/238 Analyses

The U-234/235/238 sample results for all samples, except the U-238 results for samples 1RD001043A, 1RD008033A, 1RD008043A, 1RD009013A, 1RD009023A, 1RD009033A, and 1RD009053A, demonstrated statistically positive activities greater than their respective MDAs and greater than 3x their respective uncertainties. Therefore, no validator action was necessary on these sample results.

U-235 results associated with preparation batch 511-41 (composed of samples 1RD001013A, 1RD001023A, 1RD001033A, 1RD001043A, 1RD001053A, 1RD002013A, 1RD002023A, 1RD002033A, 1RD002043A, 1RD002053A, 1RD003013A, 1RD003023A, 1RD003033A, 1RD003043A, and 1RD003053A) have been qualified 'J' due to a high LCS result (137.7% recovery) and statistically positive results greater than their respective MDAs.

Determination of the statistically positive or not statistically positive status of sample results is provided in Attachment 6, Supplemental Validation - TPR-80.

The laboratory case narrative notes that "several alpha spectra showed breakthrough from the high concentration of plutonium isotopes inherent in the samples, however, the uranium peaks were easily resolved." Because the uranium peaks were resolved from the plutonium breakthrough, qualification of results is not necessary.

6.2 Radioanalytical Data Quality Assessment Table

Project Name: Tank V-9 (TSF-18) Sampling for Operable Unit 1-10 Project

L&V Report#: BBWI-PR025-06-01
 SDG#: 1RD001013A
 TOS#: ER-SOW-380
 SOW#: ER-SOW-163

Validation Level: A Assessor's Affiliation: Portage
 Reporting Level: Tier I Assessor's Name: Bridget Hoopes
 Samples by Matrix: 45 Sludge Assessment Date: 06-12-01
 Laboratory Name: BWLVA

	Analysis Type:			Comment	
	U-234	U-235	U-238	Y	N
Verification Review Parameters					
1. Data Package Completeness	I	I	I		X
2. Evaluation of Reported Results	I	I	I		X
Validation Review Parameters					
1. Instrument Calibrations	I	I	I		X
2. Laboratory Control Sample	I	Q	I	X	
3. Blank Samples	I	I	I		X
4. Duplicate Samples	I	I	I		X
5. Analytical Yields	I	I	I		X
6. Sample Holding Times	I	I	I		X
7. Sample Preservation	NA	NA	NA		X
8. Intercomparison QC Results	Q	Q	Q	X	
9. DNEEL PE Sample Results	NA	NA	NA		X

Quality Assurance Flags:

- I Parameter is in control (meets acceptance criteria). There are no problems with the sample results
- Q Parameter is questionable. There may be minor problems with the sample results data.
- O Parameter is out of control (does not meet acceptance criteria). There may be major problems with the sample results data.
- NA Parameter is not acceptable to this analysis.
- Y Yes indicates a comment was made and be found on the comment sheet.
- N No indicates no comment was made.

6.3 Radioanalytical Data Quality Assessment Sheet

Project Name: Tank V-9 (TSF-18) Sampling for Operable Unit 1-10 Project

L&V Report#: BBWI-PR025-06-01

Laboratory Name: BWLVA

Date: 06-12-01

REVIEW PARAMETER	COMMENT
1. <i>Laboratory Control Sample</i>	<p>TPR-80, sec. 4.2.B.2 requires "the LCS matrix should be equivalent (to the extent possible) to that of the samples analyzed." The samples included in this SDG are of a sludge matrix. The LCS analyzed is of a liquid matrix. Due to the difficulty of preparing a "sludge" LCS, the use a liquid LCS is equivalent to the extent possible of a "sludge" LCS.</p> <p>In the case of U-235, one of the three LCS results was greater than the prescribed limit (137.7%). Therefore, per TPR-80, sec. 4.2.D.3, all U-235 results associated with preparation batch 511-41 (composed of samples 1RD001013A, 1RD001023A, 1RD001033A, 1RD001043A, 1RD001053A, 1RD002013A, 1RD002023A, 1RD002033A, 1RD002043A, 1RD002053A, 1RD003013A, 1RD003023A, 1RD003033A, 1RD003043A, and 1RD003053A) have been qualified 'J' due to high LCS recovery and statistically positive results greater than their MDAs.</p>
2. <i>Intercomparison QC Results</i>	<p>BWLVA received a warning flag ('W') from the DOE MAPEP intercomparison conducted in 2000 due to high bias for U-233/234 analysis. This deficiency, coupled with reporting only DOE MAPEP results has resulted in the entry of a 'Q' flag into the data quality assessment table for each analyte. However, per TPR-80, sec. 4.8.A(NOTE), and TPR-80, sec. 4.8.D.2, no qualifier flags have been assigned to sample results.</p>

6.4 Radioanalytical Data Qualifier (Validation Flag) Table

Project Name: Tank V-9 (TSF-18) Sampling for Operable Unit 1-10 ProjectL&V Report#: BBW1-PR025-06-01
SDG#: IRD001013A
TOS#: ER-SOW-380
SOW#: ER-SOW-163Validation Level: A
Reporting Level: Tier I
Samples by Matrix: 45 Sludge
Laboratory Name: BWLVAAssessors's Affiliation: Portage Environmental, Inc.
Assessor's Name: Bridget Hoopes
Assessment Date: 06-12-01

	ANALYSIS TYPE:				ANALYSIS TYPE:		
SAMPLE NUMBER:	U-234	U-235	U-238	SAMPLE NUMBER:	U-234	U-235	U-238
IRD001013A		J		IRD004053A			
IRD001023A		J		IRD005013A			
IRD001033A		J		IRD005023A			
IRD001043A		J	J	IRD005033A			
IRD001053A		J		IRD005043A			
IRD002013A		J		IRD005053A			
IRD002023A		J		IRD006013A			
IRD002033A		J		IRD006023A			
IRD002043A		J		IRD006033A			
IRD002053A		J		IRD006043A			
IRD003013A		J		IRD006053A			
IRD003023A		J		IRD007013A			
IRD003033A		J		IRD007023A			
IRD003043A		J		IRD007033A			
IRD003053A		J		IRD007043A			
IRD004013A				IRD007053A			
IRD004023A				IRD008013A			
IRD004033A				IRD008023A			
IRD004043A				IRD008033A			J

Table 6.4, Continued...

SAMPLE NUMBER:	ANALYSIS TYPE		
	U-234	U-235	U-238
1RD008043A			J
1RD008053A			
1RD009013A			J
1RD009023A			J
1RD009033A			J
1RD009043A			
1RD009053A			J

none The analysis was performed and radioactivity was detected (e.g., the radioanalytical result is statistically positive at the 95% confidence level and is above the MDC). The radionuclide is considered to be present in the sample.

N/P This analysis was not a requirement of this analytical request for the marked sample.

U The analysis was performed, but no radioactivity was detected (i.e., the radioanalytical result was not statistically positive at the 95% confidence level and/or the result was below the MDC). NOTE: *The radionuclide is not considered to be present in the sample.*

UJ The analysis was performed and the result is highly questionable due to serious analytical and/or laboratory quality control anomalies. The use of such a result is strongly discouraged. Serious analytical and/or quality control anomalies include items such as significant blank contamination, known photopeak interferences, or photopeak resolution problems, known matrix interferences, unacceptable laboratory control sample recoveries, serious instrument calibration problems, improper sample preservation, etc. NOTE: *The radionuclide may or may not be present and the result is considered highly questionable.*

J The analysis was performed and radioactivity was detected (i.e., the radioanalytical result is statistically positive at the 95% confidence level and is above the MDC). However, the result is questionable due to analytical and/or laboratory quality control anomalies and should therefore be used only as an estimated (approximated) quantity. Analytical and/or quality control anomalies include items such as: laboratory duplicate imprecision, unsatisfactory analytical yields, insufficient laboratory control sample recoveries, unacceptable PE sample results, instrument calibration problems, improper sample preservation, etc. NOTE: *The radionuclide is considered to be present, but the result may inaccurate or imprecise.*

R The analysis result is unusable and was rejected due to severe analytical and/or quality control problems. NOTE: *The radionuclide may or may not be present and the result is known to be inaccurate or imprecise.*

6.5 Summary of Data Usability

There were 135 radionuclide results associated with the Tank V-9 (TSF-18) Sampling for Operable Unit 1-10 Project in SDG: 1RD001013A. One hundred thirteen (113) of these results were assessed and left unqualified, and twenty-two (22) of these results were assessed and qualified 'J'.

All target radionuclides demonstrated compliance with the requirements specified in ER-SOW-163, ER-SOW-380, and TPR-80. Of the (135) total results reported, the (113) assessed and left unqualified and the (7) U-238 results qualified 'J' can be categorized as definitive/useable data with no associated quality assessment deficiencies. The remaining (15) U-235 results have been assessed and qualified 'J' because one of three laboratory control samples exceeded recovery limits, which may indicate high biased sample results. All (113) unqualified samples, as well as all (15) U-235 sample results are statistically positive with activities both greater than their respective MDAs and greater than their respective uncertainties. The (7) U-238 results qualified 'J' are statistically positive with activities greater than their associated MDAs and between 2x and 3x their associated uncertainty.

7. FLAGRANT CONTRACTUAL DEFICIENCIES

None.

TCLP Metal Analysis Data and Data Validation

TCLP INORGANIC ANALYSIS DATA SHEET

Contract 00000194, R1

SDG# IRD001013A

Lab ID# 0105041-46AA

Concentration Units: ug/L

[illegible]

Method code (M)

Method code (M)
"F" - Furnace
"P" - ICP
"CV" - Cold vapor

Comments:

SDG TYPE-2 FORM #1

00000000

TCLP INORGANIC ANALYSIS DATA SHEET

Contract 00000194, R1

SDG# IRD001013A

Lab ID# 0105041-47AA

Concentration Units: ug/L

[illegible]

F - Furnace
P - ICP
CV - Cold vapor

Comments:

SDG TYPE-2 FORM #1

000022

1.0 Task Specific Validation Identification Information

1. L&V Report Number: BBWI-PI336-06-01
2. SDG Number: 1RD001013A
3. SDG Type: 2
4. Number of Samples: (2)
5. Sample Matrix: (2) Sludge (TCLP Extracted)
6. Applicable Analytes: Toxicity Characteristic Leaching Procedure (TCLP)
Target Analyte List (TAL): (As, Ba, Cd, Cr, Pb, Hg,
Se, and Ag)
7. Reporting Tier: Tier-1
8. Applicable TOS#: ER-SOW-380
9. TOS Title: *Analyses of Samples Collected for the Tank V-9 (TSF-18) Sampling for Operable Unit 1-10 Project; ER-SOW-380; April 23, 2001*
10. Analytical Lab: BWXT
11. LTI Number: 0105041
12. Validator: Jennifer Norman
13. Validator Affiliation: Portage Environmental, Inc.
14. Validation Level: 'A'
15. Completion date: 06-14-01

2.0 IDV Precautions and Limitations

General precautions and limitations associated with inorganic and miscellaneous classical analyses analytical method data validation (IDV) are delineated in Section 2 of TPR-132 (*Reference 1*).

3.0 Introduction

Level 'A' inorganic data validation (IDV) [see TPR-79 (*Reference 2*)], following the procedures outlined in TPR-132 (*Reference 1*), was performed on the inorganic data package (IDP), identified as sample delivery group (SDG) number 1RD001013A, compiled by BWXT. TPR-132 is an Idaho National Engineering & Environmental Laboratory (INEEL) Sample Management Office (SMO) document that has revised the validation procedures outlined in the United States Environmental Protection Agency (USEPA) Functional Guidelines (*Reference 3*) to more aptly apply to IDPs prepared in accordance with the generic inorganic and miscellaneous classical analyses (I&MCA) statement of work [see ER-SOW-156 (*Reference 4*)] routinely requested by the INEEL SMO. BWXT analyzed (2) of (2) sludge TCLP extracted samples for As, Ba, Cd, Cr, Pb, Hg, Se, and Ag.

BWXT was contracted to analyze (2) of (2) sludge TCLP extracted samples for As, Ba, Cd, Cr, Pb, Hg, Se, and Ag; under this contract, they were to perform sample extraction in accordance with USEPA SW-846 Method 1311 (*Reference 5*), sample preparation and analysis of mercury in accordance with USEPA SW-846 Method 7470A (*Reference 6*), sample preparation of remaining analytes in accordance with USEPA SW-846 Method 3015A (*Reference 7*), and sample analysis in accordance with USEPA SW-846 Method 6010B (*Reference 8*) in conjunction with both the task order statement of work [see ER-SOW-380 (*Reference 9*)] and ER-SOW-156. The laboratory performed analysis of the ICP metals in accordance with USEPA SW-846 Method 6010A. This method is an earlier version of Method 6010B. Therefore, this method substitution is acceptable and warrants no qualification of sample results. The laboratory performed the analysis of the Tank V-9 Sampling for Operable Unit 1-10 sludge TCLP extracted samples using appropriate methods.

4.0 Sample Identification

The following table outlines the field sample identifiers, the laboratory identifications, and the appropriate sample matrix assigned to each analyte.

Table 4.0 Sample Identifications for the Tank V-9 Sampling for Operable Unit 1-10 Sludge TCLP Extracted Samples		
Field Sample Id#:	Laboratory Id#:	Original Sample Matrix:
1RD01001TI	0105041-46	Sludge
1RD01002TI	0105041-47	Sludge

5.0 Contract and Technical Review

1. The laboratory case narrative contained all of the elements outlined in ER-SOW-156.
2. The laboratory holding time critique and chain of custody forms were complete and accurate.
3. All analytes were analyzed within the 28-day holding time for mercury and the 180-day holding time for all remaining analytes as prescribed by ER-SOW-380.
4. All AQS calibration results demonstrated a correlation coefficient greater than 0.995 as prescribed by TPR-132, sec. 4.3.2.4.
5. All initial calibration verification (ICV) sample results were within the 90-110% recovery criteria as prescribed by TPR-132, sec. 4.3.3.5.5.
6. Barium (89.4%) was outside the 90-110% recovery criteria for continuing calibration verification sample results, per TPR-132, sec. 4.3.4.5.5. All barium sample results have been qualified with a 'J' validation flag due to sample results that are greater than the IDL and low CCV recovery. All remaining CCV sample results were within the 90-110% recovery criteria as outlined in TPR-132, sec. 4.3.4.5.5.
7. Low level concentration sample results were within the 50-150% acceptance criteria outlined in TPR-132, sec. 4.3.5.5.5.
8. Initial calibration blank results were all non-detect, per TPR-132, sec. 4.3.6.5.5. A positive detection for selenium was noted in the continuing calibration blank. Positive detections were noted in the preparation blank for arsenic, barium, and selenium. All remaining ICB, CCB, and PB results were all non-detect and do not warrant qualification, per TPR-132, sec. 4.3.6.5.5 and 4.3.7.5.5. In the case of multiple detections, assessment is based on the highest absolute value detection as follows:
 - Arsenic results have been assessed using positive PB criteria. Arsenic sample result 1RD01001TI does not warrant qualification as the sample result is less than the IDL, per TPR-132, sec. 4.3.7.5.5. Arsenic sample result 1RD01002TI has been qualified with a 'U' validation flag due to the sample result being greater than the IDL but less than five times the amount of analyte found in the blank, per TPR-132, sec. 4.3.7.5.5.
 - Barium results have been assessed using positive PB criteria. All barium sample results do not warrant qualification as the sample results are greater than the IDL and greater than five times the amount of analyte found in the blank, per TPR-132, sec. 4.3.7.5.5.
 - Selenium results have been assessed using positive PB criteria. Selenium sample result 1RD01001TI does not warrant qualification as the sample results is less than the IDL, per TPR-132, sec. 4.3.7.5.5. Selenium sample result 1RD01002TI has been qualified with a 'U' validation flag due to the sample result being greater than the IDL but less than five times the amount of analyte found in the blank, per TPR-132, sec. 4.3.7.5.5.
9. ICP-ICS results were within the 80-120% acceptance criteria as outlined in TPR-132, sec. 4.3.8.5.

10. Barium (78.5%), cadmium (77.8%), and silver (66.4%) were outside the 80-120% recovery criteria for matrix spike (MS) results. The laboratory failed to 'N' flag barium and cadmium results; the 'N' flag for these results has been entered during validation.

- Barium results would warrant qualification with a 'J' flag; however, barium has already been qualified based upon CCV results. This adds further merit to the 'J' qualification of barium results based upon CCV recovery results.
- Cadmium results have been qualified with a 'J' validation flag due to low percent recovery and sample results that are greater than the IDL, per TPR-132, sec. 4.3.9.5.5.
- Silver results have been qualified with a 'UJ' validation flag due to low percent recovery and sample results that are less than the IDL, per TPR-132, sec. 4.3.9.5.5.

Barium (79.0%), cadmium (78.6%), and silver (73.4%) were outside the 80-120% recovery criteria for matrix spike duplicate results. The laboratory failed to 'N' flag barium and cadmium results; the 'N' flag for these results has been entered during validation.

- Barium results would warrant qualification with a 'J' validation flag; however, barium has already been qualified based upon CCV and MS recovery results. This adds further merit to the 'J' qualification of barium based upon CCV and MS recovery results.
- Cadmium results would warrant qualification with a 'J' validation flag; however, cadmium results have already been qualified based upon MS recovery results. This adds further merit to the 'J' qualification of cadmium results based upon MS recovery results.
- Silver results would warrant qualification with a 'UJ' validation flag; however, silver results have already been qualified based upon MS recovery results. This adds further merit to the 'UJ' qualification of silver based upon MS recovery results.

11. Cadmium (-94.8%) and silver (64.0%) were outside the 75-125% recovery criteria for analytical spikes (AS), per ERD-SOW-107R2, sec. 4.4.7. AS results are assessed in conjunction with MS and serial dilution sample (SDS) results, to determine whether or not method of standard additions (MSA) is warranted. The laboratory failed to 'E' flag cadmium and silver results. So, the validator manually entered the 'E' flag for cadmium and silver during validation. The low percent recovery of cadmium adds further merit to the 'J' qualification of results based upon MS and MSD recovery results. The low percent recovery of silver adds further merit to the 'UJ' qualification of results based upon MS and MSD recovery results. However, MSA is not warranted due to MS and MSD recovery being greater than 50% and sample concentration being within 20% of the appropriate regulatory level, per TPR-132, sec. 4.3.9.5.5 subpart 4 and sec. 4.3.10.5.5.
12. Matrix spike duplicate results met the precision criteria of an RPD of less than 20% per TPR-132, sec. 4.3.12.5.4.

13. All aqueous laboratory control sample results were within the 80-120% acceptance criteria as outlined in TPR-132, sec. 4.3.13.5.5.
14. Serial dilution sample (SDS) results are assessed in conjunction with MS and AS results to determine whether or not MSA is warranted. All serial dilution results met the acceptance criteria of a percent difference less than 10% for analytes whose concentrations are minimally fifty times greater than the IDL as prescribed in ER-SOW-156, sec. 3.6.14.4. Therefore, per TPR-132, sec. 4.3.15.5.5, MSA is not warranted.
15. Linear range analysis sample results were within the 95-105% acceptance criteria as prescribed by TPR-132, sec. 4.3.16.5.5.

6.0 Data Limitations Overview

6.1 Summary of Qualified Data

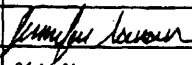
- Arsenic sample result 1RD01002TI has been qualified with a 'U' validation flag to denote that the data is non-detectable at the reported value due to positive PB detections (See CTR Comment #8).
- All barium sample results have been qualified with a 'J' validation flag to denote that the data is detectable at the reported value but that the reported value is only an estimate due to low CCV, MS, and MSD recovery (See CTR Comments #6 & #10).
- All cadmium sample results have been qualified with a 'J' validation flag to denote that the data is detectable at the reported value but that the reported value is only an estimate due to low MS, MSD, and AS recovery (See CTR Comments #10 & #11).
- Selenium sample result 1RD01002TI has been qualified with a 'U' validation flag to denote that the data is non-detectable at the reported value due to positive PB detections (See CTR Comment #8).
- All silver sample results have been qualified with a 'UJ' validation flag to denote that the data is non-detectable at the reported value but the reported value is only an estimate due to low MS, MSD, and AS recovery (See CTR Comments #10 & #11).
- All remaining data points have been assessed and remain unqualified.

6.2 Data Confirmation Summary

Table 6.2 includes summary of correctly/incorrectly reported results for SDG#: 1RD001013A.

FIELD SAMPLE DATA POINTS ASSOCIATED WITH SDG#: 1RD001013A				
Total Number	Number Confirmed	Number Confirmed to be Correctly Reported	Number Confirmed to be Falsely Reported	Actual Proportion Falsely Reported (%)
16	16	16	0	0

6.3 Data Assessment Table

L&V Report#:	BBWI-PI336-06-01	Validation Level:	'A'	Assessor Affiliation:	Portage Environmental, Inc.				
SDG#:	IRD001013A	SDG Type:	2	Assessor Name:	Jennifer Norman				
TOS#:	ER-SOW-380	Reporting Tier:	1	Assessor Signature:					
SOW#:	ER-SOW-156	Samples/Matrix:	(2) Sludge (TCLP extracted)	Assessment Date:	06-14-01				
LTI#:	0105041	Laboratory:	BWXT						
Item#	Assessment Item:	Target Analyte							
		As	Ba	Cd	Cr	Pb	Hg	Se	Ag
1	Holding Times	O	O	O	O	O	O	O	O
2	AQS Calibration	O	O	O	O	O	O	O	O
3	ICV	O	O	O	O	O	O	O	O
4	CCV	O	M	O	O	O	O	O	O
5	LLC Standard (CRI in IDP)	O	O	O	O	O	O	O	O
6	ICBs/CCBs	O	O	O	O	O	O	X	O
7	Preparation Blank	X	X	O	O	O	O	X	O
8	ICP ICSA/ICSAB	O	O	O	O	O	O	O	O
9	Matrix Spike	O	M	M	O	O	O	O	M
10	Analytical Spike	O	O	X	O	O	O	O	X
11	Laboratory Duplicate	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
12	Matrix Spike Duplicate	O	M	M	O	O	O	O	M
13	Lab/Method Control Sample	O	O	O	O	O	O	O	O
14	Method of Standard Additions	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
15	Serial Dilutions	O	O	O	O	O	O	O	O
16	LRA Standard	O	O	O	O	O	O	O	O
17	CRC Standard	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
18	Data Confirmation	O	O	O	O	O	O	O	O
19	Miscellaneous Items	O	O	O	O	O	O	O	O
20	Overall Assessment	X	M	M	O	O	O	X	M

6.3 Data Assessment Table (cont...)

- O = Assessment item was in applicable control limits and, if considered alone, would not cause any data to be assigned a "UJ", "J," or "R" validation flags.
- M = Assessment item was outside applicable control limits and, if considered alone, would: (a) cause one or more field sample data points to be assigned either a "UJ" or "J" validation flag, but (b) not cause any data to be assigned a "R" validation flag.
- Z = Assessment item was outside applicable control limits and, if considered alone, would cause one or more field data points to be assigned a "R" validation flag.
- N/A= Assessment item not applicable.
- NP = Assessment item was required but was not performed and/or documented by the laboratory.
- X = Contractual and/or technical anomalies were noted but, based on the professional judgment of the assessor, none of the associated data were adversely affected.
- I = Contractual and/or technical anomalies were noted and, based on the professional judgement of the assessor, at least a portion of the data were adversely affected and/or could not be properly assessed. As a result, at least one applicable field sample data point was qualified with either a "UJ", "J", or "R" validation flag.
- G = The units reported for at least one applicable field sample data point did not correlate with the test method employed.

6.4 Data Validation Flag Table

Target Analyte and Assigned Qualification: SDG#: 1RD001013A								
Field Sample Id#:	As	Ba	Cd	Cr	Pb	Hg	Se	Ag
1RD01001TI		J	J					UJ
1RD01002TI	U	J	J				U	UJ

Definitions of Data Validation Flags

- U - The material was analyzed for and was detected at or above the applicable detection limit. However, the associated value was less than 5 times the highest positive amount in any laboratory blank. In most instances the "U" validation flag will be accompanied by a "B" laboratory flag.
- UJ - The material was analyzed for, but was not detected. The associated value is an estimate and may be inaccurate or imprecise. A "UJ" validation flag is not differentiated from the combined action of both a "U" and "J" validation flag.
- J - The material was analyzed for and was detected at or above the applicable detection limit. The associated value is an estimate and may be inaccurate or imprecise.
- R - The accuracy of the data is so questionable that it is recommended the data not be used. For any given data point, a "R" validation flag overrides all other applicable flags.

6.5 Summary of Data Usability

There were 16 field sample data points associated with the SDG# 1RD001013A IDP. Of these field sample data points: (a) 8 were assessed and left unqualified, (b) 2 were assessed and qualified with a 'U' validation flag, (c) 2 were assessed and qualified with a 'UJ' validation flag, and (d) 4 were assessed and qualified with a 'J' validation flag. Using the criteria outlined in EPA540-R-93-071 (*Reference 10*): (1) the 8 field sample data points (50% of the total) that were assessed and left unqualified can be categorized as definitive data with no associated quality control deficiencies, (2) the 2 field sample data points (12.5% of the total) that were assessed and qualified with a 'U' validation flag can be categorized as definitive data with a non-detectable analyte concentration due to positive blank detections, (3) the 2 field sample data points (12.5% of the total) that were assessed and qualified with a 'UJ' validation flag can be categorized as definitive data with a non-detectable analyte concentration that is only an estimate due to low MS, MSD, and AS recovery, and (4) the 4 field sample data points (25% of the total) that were assessed and qualified with a 'J' validation flag can be categorized as definitive data with a positively identified analyte concentration that is only an estimate due to low CCV, MS, MSD, and/or AS recovery.

2
6/18/01
The USEPA TCLP regulatory level for cadmium (1000ug Pb/L) and mercury (200ug Hg/L) was exceeded by BWXT reported cadmium (1,000ug Pb/L) and mercury (226ug Hg/L) results for sample 1RD01002TI. Therefore, according to USEPA regulations (See section 7.4.1. in Chapter 7 of SW-846), the waste represented by sample 1RD01002TI possesses the characteristic of toxicity.

7.0 Flagrant Contractual Deficiencies

7.1 Missed Holding Times

None

7.2 Use of Unauthorized Methods

None

7.3 Other(s)

7.3.1. Laboratory Data Flags

The laboratory failed to 'N' flag barium and cadmium results, as required by ERD-SOW-107R2, sec. 4.4.6, due to matrix spike and matrix spike duplicate results that were outside the acceptable control limits. These 'N' flags have been manually entered during validation; no further qualification of barium and cadmium results is warranted as a result of this action (CTR Comment #10).

The laboratory failed to correctly 'E' flag cadmium and silver results, as required by ERD-SOW-107R2, sec. 4.4.7, due to analytical spike results that were outside the acceptable control limits. These 'E' flags have been manually entered during validation; no further qualification of cadmium and silver results is warranted as a result of this action (CTR Comment #11).

Additional Radionuclide Analysis Data and Data Validation

000011

FORM I

BRWI SAMPLE MANAGEMENT OFFICE

RADIONUCLIDE ANALYSIS RESULTS

Date: August 8, 2001

Lab Name: BWLVA

Case No.: ER-SOW-380R2

Report No.: 107074

SDG No.: 1RD05001R9

BRWI ID	Lab ID	Sample Matrix	Anal Type	Sample Value	Sample Uncer	Units	Anal Date	Sample Date	Sample Size	Yield	Det ID	MDA
1RD05001R9	0107074-01	Sludge	U-234(d)	1.36E+02	1.12E+01	pCi/g	08/03/01	04/30/01	1.0714	89.7	A04	2.45E-01
1RD05001R9	0107074-01	Sludge	U-235(d)	6.88E+00	6.70E-01	pCi/g	08/03/01	04/30/01	1.0714	89.7	A04	2.72E-01
1RD05001R9	0107074-01	Sludge	U-238(d)	7.52E-01	2.53E-01	pCi/g	08/03/01	04/30/01	1.0714	89.7	A04	2.85E-01
1RD05002R9	0107074-02	Sludge	U-234(f)	1.31E+02	1.06E+01	pCi/g	08/03/01	04/30/01	1.0573	103.5	A05	1.82E-01
1RD05002R9	0107074-02	Sludge	U-235(f)	6.78E+00	7.98E-01	pCi/g	08/03/01	04/30/01	1.0573	103.5	A05	1.39E-01
1RD05002R9	0107074-02	Sludge	U-238(f)	9.65E-01	2.40E-01	pCi/g	08/03/01	04/30/01	1.0573	103.5	A05	1.39E-01
1RD05101R9	0107074-03	Sludge	U-234(d)	1.01E+04	9.02E+02	pCi/g	08/03/01	04/30/01	0.0103	72.1	A06	3.10E+01
1RD05101R9	0107074-03	Sludge	U-235(d)	4.09E+02	6.54E+01	pCi/g	08/03/01	04/30/01	0.0103	72.1	A06	2.00E+01
1RD05101R9	0107074-03	Sludge	U-238(d)	1.60E+02	3.76E+01	pCi/g	08/03/01	04/30/01	0.0103	72.1	A06	2.00E+01
1RD05102R9	0107074-04	Sludge	U-234(f)	7.87E+03	6.76E+02	pCi/g	08/03/01	04/30/01	0.0106	74.8	A07	3.62E+01
1RD05102R9	0107074-04	Sludge	U-235(f)	3.22E+02	5.33E+01	pCi/g	08/03/01	04/30/01	0.0106	74.8	A07	2.42E+01
1RD05102R9	0107074-04	Sludge	U-238(f)	1.48E+02	3.37E+01	pCi/g	08/03/01	04/30/01	0.0106	74.8	A07	1.74E+01
1RD05201R9	0107074-05	Sludge	U-234(d)	7.08E+01	6.06E+00	pCi/g	08/03/01	05/01/01	1.1919	90.7	A18	2.00E-01
1RD05201R9	0107074-05	Sludge	U-235(d)	3.85E+00	5.27E-01	pCi/g	08/03/01	05/01/01	1.1919	90.7	A18	1.50E-01
1RD05201R9	0107074-05	Sludge	U-238(d)	5.27E-01	1.66E-01	pCi/g	08/03/01	05/01/01	1.1919	90.7	A18	1.23E-01
1RD05202R9	0107074-06	Sludge	U-234(f)	7.48E+01	6.20E+00	pCi/g	08/03/01	05/01/01	1.0340	92.9	A19	1.40E-01
1RD05202R9	0107074-06	Sludge	U-235(f)	4.95E+00	6.41E-01	pCi/g	08/03/01	05/01/01	1.0340	92.9	A19	1.40E-01
1RD05202R9	0107074-06	Sludge	U-238(f)	9.49E-01	2.39E-01	pCi/g	08/03/01	05/01/01	1.0340	92.9	A19	1.40E-01
1RD05301R9	0107074-07	Sludge	U-234(d)	3.08E+04	2.54E+03	pCi/g	08/03/01	05/02/01	0.0110	69.1	A24	1.86E+01
1RD05301R9	0107074-07	Sludge	U-235(d)	1.19E+03	1.33E+02	pCi/g	08/03/01	05/02/01	0.0110	69.1	A24	1.86E+01
1RD05301R9	0107074-07	Sludge	U-238(d)	3.74E+02	5.94E+01	pCi/g	08/03/01	05/02/01	0.0110	69.1	A24	1.86E+01
1RD05302R9	0107074-08	Sludge	U-234(f)	3.01E+04	2.57E+03	pCi/g	08/03/01	05/02/01	0.0111	66.7	A21	1.83E+01
1RD05302R9	0107074-08	Sludge	U-235(f)	1.15E+03	1.31E+02	pCi/g	08/03/01	05/02/01	0.0111	66.7	A21	1.83E+01
1RD05302R9	0107074-08	Sludge	U-238(f)	3.18E+02	5.40E+01	pCi/g	08/03/01	05/02/01	0.0111	66.7	A21	1.83E+01
1RD05401R9	0107074-09	Sludge	U-234(d)	2.40E+04	1.94E+03	pCi/g	08/03/01	05/03/01	0.0265	28.8	A22	2.24E+01
1RD05401R9	0107074-09	Sludge	U-235(d)	1.30E+03	1.43E+02	pCi/g	08/03/01	05/03/01	0.0265	28.8	A22	2.01E+01
1RD05401R9	0107074-09	Sludge	U-238(d)	8.45E+02	1.04E+02	pCi/g	08/03/01	05/03/01	0.0265	28.8	A22	2.01E+01
1RD05402R9	0107074-10	Sludge	U-234(f)	2.33E+04	1.88E+03	pCi/g	08/03/01	05/03/01	0.0258	33.9	A23	1.62E+01
1RD05402R9	0107074-10	Sludge	U-235(f)	1.08E+03	1.17E+02	pCi/g	08/03/01	05/03/01	0.0258	33.9	A23	1.62E+01
1RD05402R9	0107074-10	Sludge	U-238(f)	7.95E+02	9.36E+01	pCi/g	08/03/01	05/03/01	0.0258	33.9	A23	1.62E+01
1RD05501R9	0107074-11	Sludge	U-234(d)	5.29E+04	4.34E+03	pCi/g	08/03/01	05/08/01	0.0113	52.2	A24	2.39E+01
1RD05501R9	0107074-11	Sludge	U-235(d)	2.35E+03	2.39E+02	pCi/g	08/03/01	05/08/01	0.0113	52.2	A24	2.39E+01
1RD05501R9	0107074-11	Sludge	U-238(d)	9.61E+02	1.21E+02	pCi/g	08/03/01	05/08/01	0.0113	52.2	A24	2.39E+01
1RD05502R9	0107074-12	Sludge	U-234(f)	5.85E+04	4.70E+03	pCi/g	08/03/01	05/08/01	0.0113	46.5	A03	4.13E+01
1RD05502R9	0107074-12	Sludge	U-235(f)	2.52E+03	2.73E+02	pCi/g	08/03/01	05/08/01	0.0113	46.5	A03	3.40E+01
1RD05502R9	0107074-12	Sludge	U-238(f)	1.06E+03	1.45E+02	pCi/g	08/03/01	05/08/01	0.0113	46.5	A03	3.40E+01
1RD05601R9	0107074-13	Sludge	U-234(d)	5.87E+02	4.56E+01	pCi/g	08/03/01	05/03/01	1.2042	45.4	A04	4.32E-01
1RD05601R9	0107074-13	Sludge	U-235(d)	2.80E+01	2.86E+00	pCi/g	08/03/01	05/03/01	1.2042	45.4	A04	4.79E-01

FORM I

BBW SAMPLE MANAGEMENT OFFICE

RADIONUCLIDE ANALYSIS RESULTS

Date: August 8, 2001

Lab Name: BWLVA

Case No.: ER-SOW-380R2

Report No.: 107074

SDG No.: 1RD05001R9

BBW ID	Lab ID	Sample Matrix	Anal Type	Sample Value	Sample Uncer	Units	Anal Date	Sample Date	Sample Size	Yield	Det ID	MDA
1RD05601R9	0107074-13	Sludge	U-238(d)	1.31E+01	1.62E+00	pCi/g	08/03/01	05/03/01	1.2042	45.4	A04	5.01E-01
1RD05602R9	0107074-14	Sludge	U-234(f)	5.61E+02	4.49E+01	pCi/g	08/03/01	05/03/01	1.2973	40.4	A05	3.80E-01
1RD05602R9	0107074-14	Sludge	U-235(f)	3.09E+01	3.05E+00	pCi/g	08/03/01	05/03/01	1.2973	40.4	A05	2.90E-01
1RD05602R9	0107074-14	Sludge	U-238(f)	1.33E+01	1.60E+00	pCi/g	08/03/01	05/03/01	1.2973	40.4	A05	2.90E-01
1RD05701R9	0107074-15	Sludge	U-234(d)	4.50E+03	3.91E+02	pCi/g	08/03/01	05/03/01	0.0258	66.5	A06	1.34E+01
1RD05701R9	0107074-15	Sludge	U-235(d)	1.84E+02	2.89E+01	pCi/g	08/03/01	05/03/01	0.0258	66.5	A06	8.67E+00
1RD05701R9	0107074-15	Sludge	U-238(d)	3.06E+01	1.06E+01	pCi/g	08/03/01	05/03/01	0.0258	66.5	A06	8.67E+00
1RD05702R9	0107074-16	Sludge	U-234(f)	3.93E+03	3.26E+02	pCi/g	08/03/01	05/03/01	0.0283	72.1	A07	1.41E+01
1RD05702R9	0107074-16	Sludge	U-235(f)	1.56E+02	2.35E+01	pCi/g	08/03/01	05/03/01	0.0283	72.1	A07	9.41E+00
1RD05702R9	0107074-16	Sludge	U-238(f)	2.75E+01	8.87E+00	pCi/g	08/03/01	05/03/01	0.0283	72.1	A07	6.75E+00
1RD05801R9	0107074-17	Sludge	U-234(d)	3.43E+03	2.91E+02	pCi/g	08/03/01	05/07/01	0.0263	81.6	A08	1.10E+01
1RD05801R9	0107074-17	Sludge	U-235(d)	1.11E+02	2.03E+01	pCi/g	08/03/01	05/07/01	0.0263	81.6	A08	7.91E+00
1RD05801R9	0107074-17	Sludge	U-238(d)	7.34E+00	5.36E+00	pCi/g	08/03/01	05/07/01	0.0263	81.6	A08	7.91E+00
1RD05802R9	0107074-18	Sludge	U-234(f)	3.49E+03	3.02E+02	pCi/g	08/03/01	05/07/01	0.0256	74.0	A18	1.14E+01
1RD05802R9	0107074-18	Sludge	U-235(f)	1.19E+02	2.04E+01	pCi/g	08/03/01	05/07/01	0.0256	74.0	A18	8.59E+00
1RD05802R9	0107074-18	Sludge	U-238(f)	1.05E+01	5.79E+00	pCi/g	08/03/01	05/07/01	0.0256	74.0	A18	7.05E+00
1RD05901R9	0107074-19	Sludge	U-234(d)	5.98E+00	7.13E-01	pCi/g	08/03/01	04/30/01	1.4253	73.8	A19	1.28E-01
1RD05901R9	0107074-19	Sludge	U-235(d)	2.02E-01	1.08E-01	pCi/g	08/03/01	04/30/01	1.4253	73.8	A19	1.28E-01
1RD05901R9	0107074-19	Sludge	U-238(d)	2.49E+00	3.99E-01	pCi/g	08/03/01	04/30/01	1.4253	73.8	A19	1.28E-01
1RD05902R9	0107074-20	Sludge	U-234(f)	5.29E+00	8.56E-01	pCi/g	08/03/01	04/30/01	1.5039	73.7	A21	1.22E-01
1RD05902R9	0107074-20	Sludge	U-235(f)	3.07E-01	1.27E-01	pCi/g	08/03/01	04/30/01	1.5039	73.7	A21	1.22E-01
1RD05902R9	0107074-20	Sludge	U-238(f)	3.11E+00	4.56E-01	pCi/g	08/03/01	04/30/01	1.5039	73.7	A21	1.22E-01

Comments: The Analysis Types have been annotated with a "f" or "d" designating the preparation technique used, where "f" represents a molten salt fusion method and "d" represents a strong mineral acid dissolution method.

FORM II

BWM SAMPLE MANAGEMENT OFFICE

RADIONUCLIDE QUALITY CONTROL RESULTS

Lab Name:

BWLVA

Date:

August 8, 2001

Report No.:

107074

Case No.:

ER-SOW-380R2

SDG No.:

1RD05001R9

QC Sample ID	Sample Type	Anal Type	Sample Value	Sample Uncer	Known Value	Known Uncer	Units	LCS Recov	Anal Date	Chem Yield	Det ID	MDA
BL511-81	BLK	U-234	1.74E+01	5.18E+00	0.00E+00	0.00E+00	PC/L	NA	08/03/2001	78.7	A23	3.61E+00
BL511-81	BLK	U-235	-3.35E-01	1.20E+00	0.00E+00	0.00E+00	PC/L	NA	08/03/2001	78.7	A23	4.03E+00
BL511-81	BLK	U-238	8.68E-01	1.52E+00	0.00E+00	0.00E+00	PC/L	NA	08/03/2001	78.7	A23	3.61E+00
0107074-04D	DUP	U-234(f)	8.46E+03	7.33E+02	7.87E+03	6.76E+02	PC/g	NA	08/03/2001	84.1	A08	2.65E+01
0107074-04D	DUP	U-235(f)	2.65E+02	4.87E+01	3.22E+02	5.33E+01	PC/g	NA	08/03/2001	84.1	A08	1.90E+01
0107074-04D	DUP	U-238(f)	3.44E+02	5.71E+01	1.48E+02	3.37E+01	PC/g	NA	08/03/2001	84.1	A08	1.90E+01
QC511-81	LCS	U-234	8.20E+02	5.91E+01	4.83E+02	2.17E+01	PC/L	128.3	08/03/2001	63.7	A22	5.33E+00
QC511-81	LCS	U-235	2.70E+01	7.41E+00	2.25E+01	1.01E+00	PC/L	120.0	08/03/2001	63.7	A22	4.78E+00
QC511-81	LCS	U-238	5.81E+02	5.59E+01	4.83E+02	2.17E+01	PC/L	120.2	08/03/2001	63.7	A22	4.78E+00

Comments: The Analysis Types have been annotated with a "f" or "d" designating the preparation technique used, where "f" represents a molten salt fusion method

and "d" represents a strong mineral acid dissolution method.

000013

ORIGINAL

RADIOANALYTICAL DATA LIMITATIONS AND VALIDATION REPORT

for the

TANK V-9 (TSF-18) SAMPLING OU 1-10

RECEIVED

AUG 27 2001

by

ENVIRONMENTAL RESTORATION DEPT.

ENVIRONMENTAL DATA SERVICES, LTD.

**Report Number
ER354**

**Analyses Types
Isotopic Uranium**

**SDG No.
1RD05001R9**

Prepared by:

Christina Washington

Date:

8/24/01

Approved by:

Diane Walden

Date:

8.24.01

1. INTRODUCTION

Twenty sludge samples were collected in April and May of 2001 to support the TANK V-9 (TSF-18) SAMPLING OU 1-10 program. The samples were analyzed for isotopic uranium at BWXT Services, Inc. – Nuclear Environmental Laboratory Services, Lynchburg, VA.

The laboratory data package met the Tier-1 reporting requirements as per ER-SOW-163. The data were validated in accordance with Level-A validation as defined in INEEL Guidance Document (GDE)-7003, "Levels for Analytical Methods Data Validation" and data validation technical procedure (TPR)-80 "Radioanalytical Data Validation."

2. TASK SPECIFIC VALIDATION IDENTIFICATION INFORMATION

A. L&V Report Number: <u>ER354</u>	F. Reporting Tier: <u>1</u>
B. SDG Number: <u>1RD05001R9</u>	G. Validation Level: <u>A</u>
C. Number of Samples: <u>20</u>	H. TOS Number: <u>ER-SOW-380R²</u> <i>2am 8/27/01</i>
D. Sample Type/Matrix <u>Sludge</u>	I. Analytical Laboratory: <u>BWXT Services, Inc.-</u> <u>INEL Services</u>
E. <u>Analyses Type: Isotopic Uranium</u>	J. LTI Number: <u>0107074</u>
<u></u>	K. Validator Affiliation: <u>EDS Ltd.</u>
<u></u>	L. Validator Name: <u>Adrianna S. Washington</u>
<u></u>	M. Completion Date: <u>08/24/01</u>

3. DATA VALIDATION PRECAUTIONS AND LIMITATIONS

General precautions and limitations associated with radioanalytical method data validation apply to this L&V report and are described in Section 2 of TPR-80 (*Idaho National Engineering and Environmental Laboratory Sample Management Office Technical Procedure for Radioanalytical Data Validation*, TPR-80, Rev. 2, May 1997).

4. SAMPLE IDENTIFICATION

The INEEL field sample identification numbers are listed on the INEEL chain-of-custodies included in this data package. Samples were collected in April and May 2001.

FIELD SAMPLE ID NUMBER	LABORATORY ID NUMBER	SAMPLE MATRIX	FIELD SAMPLE ID NUMBER	LABORATORY ID NUMBER	SAMPLE MATRIX
1RD05001R9	0107074-01	SLUDGE	1RD05501R9	0107074-11	SLUDGE
1RD05002R9	0107074-02	SLUDGE	1RD05502R9	0107074-12	SLUDGE
1RD05101R9	0107074-03	SLUDGE	1RD05601R9	0107074-13	SLUDGE
1RD05102R9	0107074-04	SLUDGE	1RD05602R9	0107074-14	SLUDGE
1RD05201R9	0107074-05	SLUDGE	1RD05701R9	0107074-15	SLUDGE
1RD05202R9	0107074-06	SLUDGE	1RD05702R9	0107074-16	SLUDGE
1RD05301R9	0107074-07	SLUDGE	1RD05801R9	0107074-17	SLUDGE
1RD05302R9	0107074-08	SLUDGE	1RD05802R9	0107074-18	SLUDGE
1RD05401R9	0107074-09	SLUDGE	1RD05901R9	0107074-19	SLUDGE-Soil
1RD05402R9	0107074-10	SLUDGE	1RD05902R9	0107074-20	SLUDGE-Soil

1RD05901R9 and 1RD05902R9 are soils (MAPEP057) see BAM-104-01.

5. CONTRACT AND TECHNICAL REVIEW (CTR)

This section contains the contract and technical review comments that describe the findings and observations for each of the main verification and validation parameters described in TPR-80. The actions taken for each analysis and the reasons why a particular data qualifier flag was assigned are also included. The following verification and validation parameters were reviewed:

A. COMPLETENESS OF THE DATA REPORT PACKAGE

The BWXT data package was complete and did meet all the required Tier-1 reporting requirements.

B. EVALUATION OF REPORTED RESULTS

The radioanalytical results were properly reported and the reporting forms contained all the required sample and analytical information. The required MDA was not met for isotopic uranium in any samples in this data group. This is most likely due to the activity level in the samples and the count time (shorter) needed for good counting statistics.

C. DETECTOR SYSTEM CALIBRATIONS AND OPERATIONAL PERFORMANCE CHECKS

All calibrations, calibration verification checks, and background checks provided on ER-SOW-163 Form III's show that the instruments used were "in calibration" and operating properly during the counting/analysis of the reported samples.

D. LABORATORY CONTROL SAMPLE RESULTS

Laboratory control samples (LCS) were run with this set of data and each percent recovery satisfied the LCS acceptance criteria. The LCS acceptance criteria vary with the uncertainty (relative standard deviation) associated with the LCS result.

A laboratory control sample was processed for isotopic-U. All LCS recoveries for the uranium isotopes were outside of the acceptance tolerance window.

The samples that were observed to have statistically positive activity at the 95% confidence level for the uranium isotopes have been qualified as "J", estimated.

E. METHOD BLANK RESULTS

A laboratory-generated blank sample (method blank) analyzed with each sample delivery group is a means of determining the existence and magnitude of contamination resulting from the sample preparation and analysis/measurement process. Any statistically positive activity detected for a targeted radionuclide indicates a potential positive bias in the project sample result for that radionuclide.

Method blank BL511-81 was statistically positive at 2-Sigma TPU for U-234. The U-234 activity was also greater than the MDA. U-234 for method blank BL511-81 has been reported without qualification.

All samples in this data set were related to the U-234 method blank contamination. Those U-234 sample values were statistically positive at the 95% confidence level, but the mean difference values between the blank and samples were greater than three. Also, the sample results and the U-234 blank activity differ by a factor greater than ten. Therefore, the U-234 results required no qualification.

Nevertheless, the U-234 sample results were previously qualified for the related noncompliant laboratory control sample.

For all remaining radionuclides analyzed, the method blank results met the acceptance criteria (i.e., the results were not statistically positive and were less than their respective MDA's). No validation action was necessary.

F. DUPLICATE SAMPLE RESULTS

One laboratory-generated duplicate pair (split) was analyzed with this set of data for isotopic uranium. The laboratory demonstrated that duplicate precision for isotopic-U was achieved (i.e., the mean difference was ≤ 3 and/or the relative percent difference was $\leq 30\%$ (solid).

Please note, mean difference and relative percent difference values were elevated for statistically positive isotopes only.

G. ANALYTICAL YIELDS

The efficiency of a radiochemical separation is determined and evaluated by measuring the analytical yield. A known amount of tracer or a chemical carrier added to the sample is used to determine chemical yield or recovery. The tracer employed, possesses chemical behavior similar to the target radionuclide. The tracer is an isotope, which is not expected occur in the sample to be analyzed and for most procedures, the recovery is determined using an isotope of the analyte of interest

All appropriate tracer yield values were present and evaluated. Upon review, all yields observed fell within the window of acceptance criteria.

H. HOLDING TIME

The holding time requirement (i.e., <6 months) was met.

I. SAMPLE PRESERVATION

Preservation for the sludge samples in this delivery group was not required.

J. INTERCOMPARISON QC RESULTS

Intercomparison QC results were provided by the laboratory for the EPA-Las Vegas Performance Evaluation Program, Mixed Analyte Performance Evaluation Program (MAPEP) – Department of Energy, and the Environmental Measurements Laboratory Department of Energy Quality Assessment Program. The laboratory demonstrates accuracy and precision for these analyses.

K. PERFORMANCE EVALUATION (PE) SAMPLES

There was no performance evaluation sample submitted with this sample delivery group.

6. **DATA LIMITATIONS AND USABILITY OVERVIEW**

This section provides an overview of the limitations of the data for each sample and for each analysis.

6.1 **Summary of Qualified Data**

The radionuclide analyses of the samples in this delivery group that received data qualifier flags are listed below.

6.1.1 **Isotopic Uranium Data**

Nearly all samples in this delivery group contained statistically positive activity at the 95% confidence level for isotopic uranium. Those uranium isotope sample results however, were assigned a "J" validation flag and qualified estimated, due to the related noncompliant laboratory control sample. The following describes the exceptions.

The U-238 values for samples IRD05801R9 and IRD05802R9 had no statistically positive activity at 2-Sigma TPU and have been flagged "U", nondetected.

Sample IRD05901R9 was found to exhibit no statistically positive activity at the 95% confidence level for U-235. The U-235 result has been flagged "U", nondetected.

6.2 Radioanalytical Data Quality Assessment Table

The data quality assessment table lists the quality-related findings of the verification and validation parameters for each analysis type.

Project Name: TANK V-9 (TSF-18) SAMPLING OU 1-10

L&V Report #: ER354

Validation Level: A

Assessor's Affiliation: Env. Data Svcs.

SDG #: 1RD05001R9

Reporting Tier: 1

Assessor's Name: Adrianna Washington

TOS #: ER-TOS-380R/2

Samples by matrix: Sludge

Assessment Date: 08/24/01

SOW #: ER-SOW-163

Laboratory Name: BWXT Services, Inc.-NEL

8/27/01

Analysis Type	Iso-U	Comment	
Verification Review Parameters		Y	N
1. Data Package Completeness	I		X
2. Evaluation of Reported Results	Q	X	
Validation Review Parameters			
1. Instrument Calibration Checks	I		X
2. Laboratory Control Samples	Q	X	
3. Blank Samples	Q	X	
4. Duplicate Samples	I		X
5. Analytical Yields	I		X
6. Sample Holding Times	I		X
7. Sample Preservation	I		X
8. Intercomparison QC Results	N/A		X
9. PE Sample Results (blinds)	N/A		X

Quality Assessment Flags:	I	Parameter is in control (meets acceptance criteria). There are no problems with the sample results data.
	Q	Parameter is questionable. There may be minor problems with the sample results data.
	O	Parameter is out of control (does not meet acceptance criteria). There may be major problems with the sample results data.
	NA	Parameter is not applicable to this analysis.
Comments Flags:	Y	Yes indicates a comment was made and can be found on the Comment Sheet.
	N	No indicates no comment was made.

6.3 Data Qualifier (Validation Flag) Table

The data qualifier table lists the qualification (validation) flags assigned to each analysis result.

Project Name: TANK V-9 (TSF-18) SAMPLING OU 1-10

L&V Report #: ER354

Validation Level: A

Assessor's Affiliation: Env. Data Svcs.

SDG #: 1RD05001R9

Reporting Tier: 1

Assessor's Name: Adrianna Washington

TOS #: ER-SOW-380R12

Samples by matrix: Sludge

Assessment Date: 08/24/01

SOW #: ER-SOW-163

Laboratory Name: BWXT Services, Inc.-NEL

Analysis Type	U-234	U-235	U-238
Sample Number			
IRD05001R9	J	J	J
IRD05002R9	J	J	J
IRD05101R9	J	J	J
IRD05102R9	J	J	J
IRD05201R9	J	J	J
IRD05202R9	J	J	J
IRD05301R9	J	J	J
IRD05302R9	J	J	J
IRD05401R9	J	J	J
IRD05402R9	J	J	J
IRD05501R9	J	J	J
IRD05502R9	J	J	J
IRD05601R9	J	J	J
IRD05602R9	J	J	J
IRD05701R9	J	J	J
IRD05702R9	J	J	J
IRD05801R9	J	J	U
IRD05802R9	J	J	U
IRD05901R9	J	U	J
IRD05902R9	J	J	J

MAPEP Soil See BAM-104-01.
MAPEP Soil

Bam
8/27/01

DEFINITIONS OF DATA QUALIFIER (VALIDATION) FLAGS USED IN THIS REPORT

Flag	Definition
U	<p>The analysis was performed, but no radioactivity was detected (i.e., the radioanalytical result was not statistically positive at the 95% confidence level and/or the result was below its MDA). The "U" qualifier flag is also applicable to any result reported as zero (0) (+/- an associated uncertainty).</p> <p>NOTE: <i>The radionuclide is not considered to be present in the sample</i></p>
UJ	<p>The analysis was performed and a statistically positive result was reported at the 95% confidence interval. However, the result is highly questionable (false positive) due to analytical and/or laboratory quality control anomalies. The use of such a result is strongly discouraged. Analytical and quality control anomalies include such items as; significant blank contamination, known photopeak interferences and/or photopeak resolution problems, known matrix interferences, unacceptable laboratory control sample recoveries, serious instrument calibration problems, improper sample preservation, etc.</p> <p>NOTE: <i>The radionuclide may or may not be present in the sample and the result is considered highly questionable.</i></p>
J	<p>The analysis was performed and radioactivity was detected (i.e., the radioanalytical result is statistically positive at the 95% confidence level and is above its MDA). However, the result is questionable due to analytical and/or laboratory quality control anomalies and should, therefore, be used only as an estimated (approximated) quantity. Analytical and/or quality control anomalies include such items such as; laboratory duplicate imprecision, unsatisfactory analytical yields, insufficient laboratory control sample recoveries, unacceptable PE sample results, instrument calibration problems, improper sample preservation, etc.</p> <p>NOTE: <i>The radionuclide is considered to be present in the sample, but the result may not be an accurate representation of the amount of activity actually present in the sample.</i></p>
R	<p>The analysis result is unusable and was rejected due to severe analytical and/or quality control problems.</p> <p>NOTE: <i>The radionuclide may or may not be present and the result is known to be inaccurate or imprecise.</i></p>

Radioanalytical Data Quality Assessment Comment Sheet

Project Name: TANK V-9 (TSF-18) SAMPLING OU 1-10

L&V Report: #354

Laboratory Name BWXT Services, Inc.-NEI

Date: 08/24/01

[illegible]

6.4 Summary of Data Usability

There were a total of 60 radionuclide results associated with the samples in this sample delivery group (SDG). Fifty-seven of these results were assessed qualified with "J" validation flag. The remaining three results were qualified with a "U" validation flag.

The three results qualified with a "U" flag, are not statistically positive at the 95% confidence level and/or are below their MDA, and are therefore, considered nondetected (i.e., the radionuclide is not considered to be present in the samples). The 57 estimated or "J" flagged data cannot be categorized as definitive data. The use of these results is strongly discouraged.

7. FLAGRANT CONTRACTUAL DEFICIENCIES

None.

8. DEFINITIONS

The terminology, acronyms and definitions used in the L&V report are provided to assure that there is complete understanding of their application and use in the INEEL SMO data validation process.

DOE/EML. The U.S. Department of energy (DOE) Environmental Measurements Laboratory (EML) Quality Assessment Program (QAP).

DOE/MAPEP. The U.S. Department of Energy (DOE, Office of Environmental Management, Mixed Analyte Performance Evaluation Program (MAPEP), administered by the DOE-ID Radiological and Environmental Sciences Laboratory (RESL).

Data Quality Assessment Flag. Quality assessment flags are incorporated into a quality assessment table to provide information relating directly to the quality of the radioanalytical data. Quality assessment flags are not assigned to, nor are they associated with, individual project sample results. Further discussion can be found in Section 1.2 of this TPR-80.

Data Qualifier Flag. The flag (letter codes) assigned to individual sample results during the data validation process to indicate the potential limitations and usability of the sample data.

Data Validation. A systematic review and evaluation process, performed external from the data generator, that applies a defined set of performance-based criteria to a body of data that may result in physical qualification of the data. The purpose of data validation is to determine the quality and defensibility of the reported radioanalytical data (which provides a level of confidence that a radionuclide is present or absent), and to establish limitations, applications, and usability of the data.

Difference Factor. A mathematical test to determine the difference in activity levels between sample results and the method blank results. The equation is shown in Section 4.3.C.4 of TPR-80.

EPA/PESP. The U.S. Environmental Protection Agency (EPA) Environmental Monitoring Systems Laboratory (EMSL) Performance Evaluation Studies Program (PESP).

Laboratory Control Sample (LCS). The LCS is a certified material or an aliquot of a matrix (blank), which is free of radionuclide interference's (and the constituents of interest), that is spiked with a known concentration of a target radionuclide(s) and is put through the entire analytical/measurement process. Provides an indication of the adequacy of the laboratory procedure to measure the constituent of interest.

Laboratory Duplicate. A laboratory-generated split of an actual sample that is put through the same exact analytical/measurement process as the original sample. Provides an indication of analytical variability/precision or sample inhomogeneity.

Laboratory Task Identification (LTI). This is the laboratory task identification (or work order) number assigned by the laboratory to the analytical data report package.

Mean Difference (MD). A standard statistical method of assessing differences between radioactivity measurements and determining the significance of those differences. It is used in this procedure to evaluate the statistical difference between method blank results and sample results and to evaluate results associated with duplicate measurements. The equation used to perform mean difference calculations is shown in Sections 4.3.C.4 and 4.4.C.3 of TPR-80.

Method Blank. A laboratory-generated sample, representative of the sample matrix being analyzed, that contains none of the constituents of interest that has gone through the entire analytical and measurement process using the same reagents added to the samples being analyzed. The blank provides verification that contamination has not occurred during the handling, preparation, and analysis of the samples.

Minimum Detectable Activity (MDA). The minimum amount of radioactivity that can be reliably detected in a sample (with an established degree of confidence) under certain defined sets of background, sample, instrument, analytical and measurement conditions. The MDA generally refers to a limit that is sample-specific and is determined from the actual sample being measured. It is more of an "at-the-moment" determination of what is actually detectable.

Positive Value. A statistical determination that identifies the "presence" of radioactivity in a sample when the analytical result is greater than two times the reported one sigma error of that result.

Quality Assessment Flag. Quality assessment flags are incorporated into a quality assessment table to provide information relating directly to the quality of the radioanalytical data. Quality assessment flags are not assigned to, nor are they associated with, individual project sample results. Further discussion can be found in Section 1.2 of this TPR-80.

Relative Percent Difference (RPD). A mathematical test used to determine the difference between sample results and duplicate results. The equation used to perform RPD calculations is shown in Section 4.4.C.4 of TPR-80.

Statistically Positive. A statistical determination that identifies the "presence" of radioactivity in a sample when the analytical result is greater than two times the reported one sigma error of that result.

Yield. Is a measure of the efficiency of the radiochemical separation process. It is determined by adding a known amount of radioactive tracer or chemical carrier to the sample prior to sample preparation and analysis and measuring the analytical yield (gravimetrically or radiometrically) at the completion of the analytical/measurement process. The yield determinations are used in the calculation of sample results.

9. REFERENCES

- A. Bechtel BWXT Idaho, LLC, "Radioanalytical Data Validation," Sample Management Office Technical Procedure, TPR-80, May 1997.
- B. Bechtel BWXT Idaho, LLC, "INEL Sample Management Office Statement of Work for Radionuclide Analysis," INEL-95/039, ER-SOW-163, February 1995.
- C. Bechtel BWXT Idaho, LLC, "Levels of Analytical Method Data Validation," Environmental Operations Branch Sample Management Office, GDE-7003, March 2001.

10. ATTACHMENTS

The following items are included as an attachment to this L&V report:

- A. The validated radionuclide analysis results (Forms I and II).
- B. The laboratory data package cover page and case narrative.
- C. A copy of the INEEL chain-of-custody form.
- D. The computations performed to assess sample duplicate results.
- E. ER-SOW-380R/2

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8/27/01

